

TECHNICAL MEMORANDUM

City of Alexandria Storm Sewer Capacity Analysis

^{2A.04D}
Task Order ~~2B~~ – Cleaning & CCTV (Business Center Drive & Colvin St)

PREPARED FOR: CH2M HILL

PREPARED BY: Baker

DATE: February 24, 2012

Field Work Summary (Nov 17-25, 2011)

VPS reported to Baker that large amounts of debris had to be removed from the subject storm pipes before inspection was possible. VPS estimated that some pipes were more than 90% filled with material prior to cleaning operations. It is to be noted that following the first round of cleaning, additional debris continued to wash into the subject storm pipes due to subsequent rain events. Following the cleaning, the pipes showed to be in generally good conditions, though there are occasional cracks, minor breaks, or intruding laterals; as noted in the inspection report. A few pipes have repair patches visible on the top edge. These defects are noted in further detail in the hard copy of VPS's report. Aside from the initial heavy buildup of debris, there does not appear to be any major blockages in the subject pipes.

VPS inspected approximately 1,718 linear feet of 36-inch diameter reinforced concrete pipe.



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**CH2M Hill
1100 Wayne Ave.
Suite 670
Silver Spring, MD 20910**

**Prepared For:
Laurens VanDerTak**

**City of Alexandria
Storm Sewer Capacity Analysis Contract
November 17 – 25, 2011**

A Carylton Company

CCTV Surveys List for CH2MIHILL

Number of surveys in this list is 15 as of Wednesday, November 30, 2011

Unit of measure: ft

Setup Date	Street	Start MH	Finish MH	Dir	Size inch	Pre Clean	Media Number	Scheduled Length	Surveyed Length
1 11/17/2011	COLVIN ST	INLET-1	STRUCTURE-1	D	36	H	A-1	126.0	126.0
2 11/17/2011	COLVIN ST	INLET-1	INLET-2	U	36	H	A-1	52.0	52.0
3 11/18/2011	BUSINESS CENTER DR	STRUCTURE-1	MH-5	D	36	H	A-2	261.0	261.0
4 11/18/2011	BUSINESS CENTER DR	MH-5	MH-3	D	36	H	A-2	79.0	79.0
5 11/19/2011	COLVIN ST	STRUCTURE-1	MH-6	D	36	H	A-3	261.0	261.0
6 11/19/2011	COLVIN ST	STRUCTURE-1	END OF PIPE	U	36	H	A-3	174.0	174.0
7 11/19/2011	BUSINESS CENTER DR	MH-5	MH-3	D	36	H	A-3	87.0	87.0
8 11/19/2011	BUSINESS CENTER DR	MH-3	BURIED MH	D	36	H	A-3	95.0	95.0
9 11/22/2011	BUSINESS CENTER DR	MH-4	MH-6	U	36	H	A-4	85.0	85.0
10 11/25/2011	BUSINESS CENTER DR	MH-4	BURIED MH	D	36	H	A-5	94.0	94.0
11 11/25/2011	BUSINESS CENTER DR	MH-1	BURIED MH	U	36	H	A-5	164.4	164.4
12 11/25/2011	BUSINESS CENTER DR	MH-1	OUTFALL	D	36	H	A-5	39.0	39.0
13 11/25/2011	BUSINESS CENTER DR	BURIED MH-2	OUTFALL	D	36	H	A-5	38.0	38.0
14 11/25/2011	BUSINESS CENTER DR	BURIED MH-2	MH-2	U	36	H	A-5	119.0	119.0
15 11/25/2011	BUSINESS CENTER DR	MH-2	BURIED MH	U	36	H	A-5	43.2	43.2

Total Scheduled Length 1,638.6

Total Length Surveyed 1,717.6



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DUKE ST

COLVIN ST

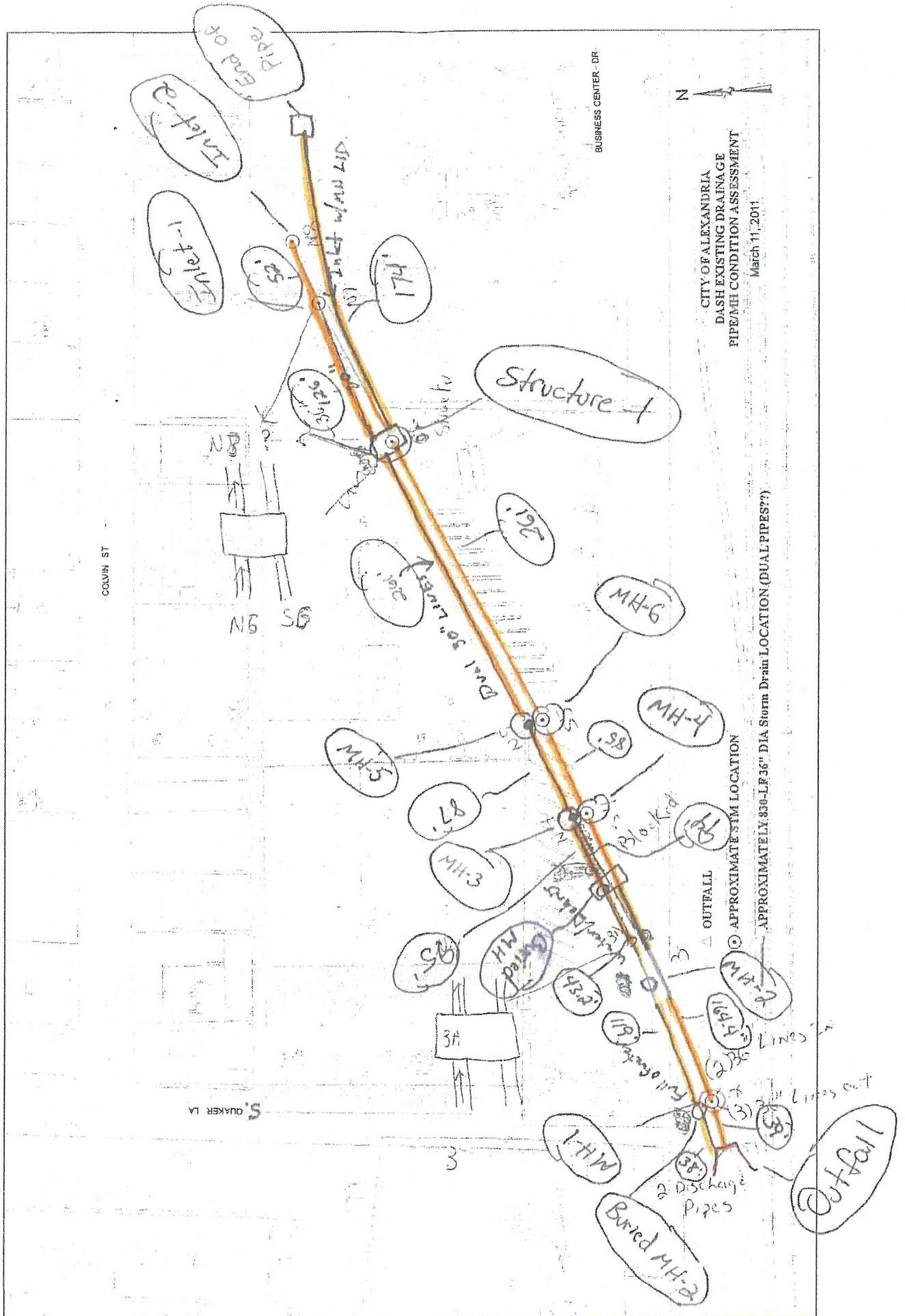
S. QUAKER LA

BUSINESS CENTER DR



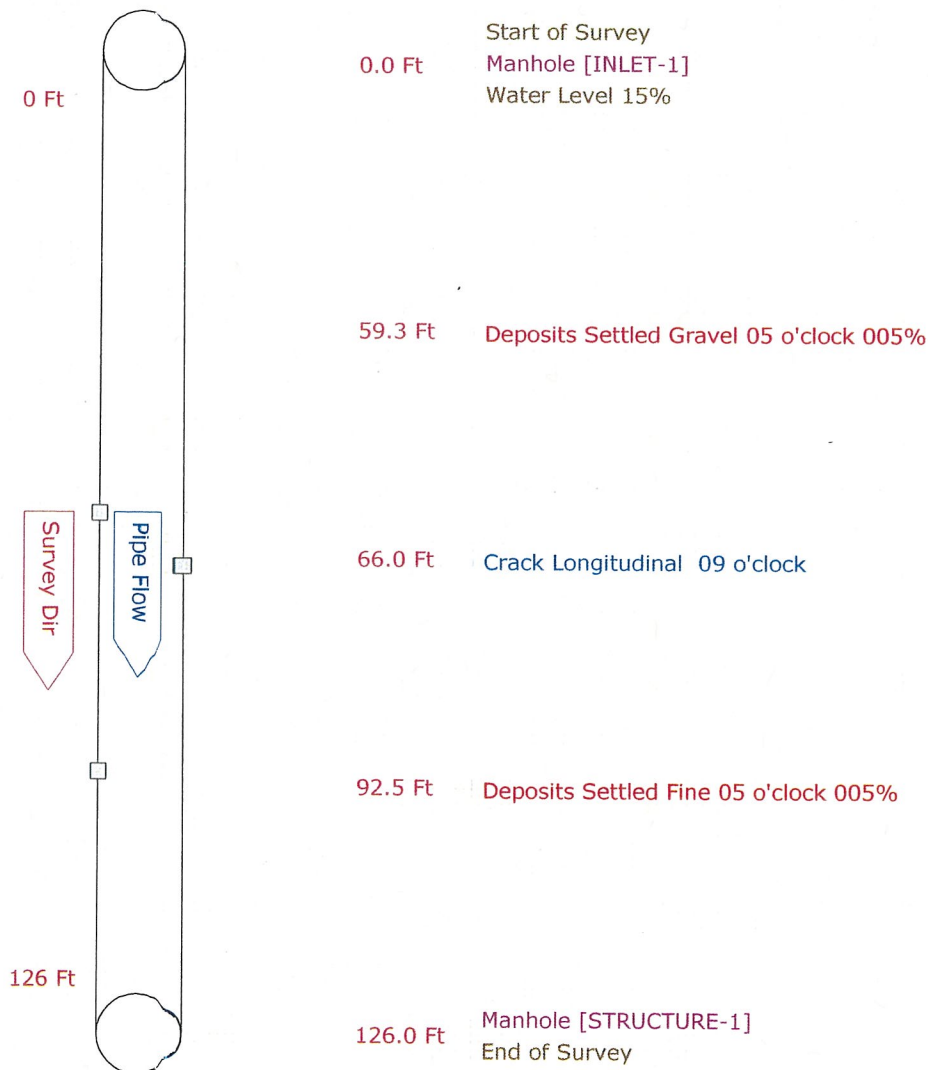
CITY OF ALEXANDRIA
DASH EXISTING DRAINAGE
PIPE/MH CONDITION ASSESSMENT
March 11, 2011

APPROXIMATELY 830-LF 36" DIA Storm Drain LOCATION (DUAL PIPES??)



Pipe Graphic Report of PSR INLET-1 X for CH2MIHILL

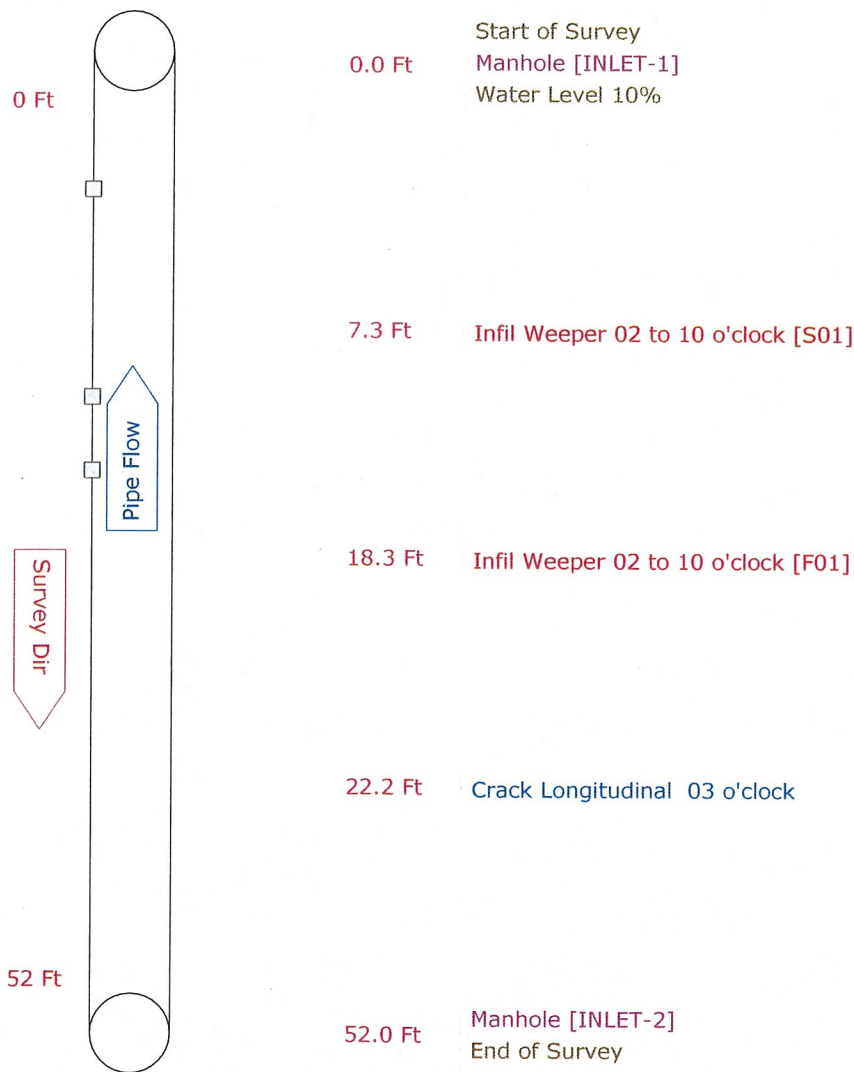
Setup 1	Surveyor JRH	Certificate # U-809-9224	System Owner CITY OF ALEXANDRIA
Drainage	Survey Customer CH2MHILL		
P/O #	Date 2011/11/17	Time 8:20	Street COLVIN ST
City ALEXANDRIA	Further location details		
Start INLET-1	Rim to invert 0.00	Grade to invert	Rim to grade Ft
Finish STRUCTURE-1	Rim to invert 0.00	Grade to invert	Rim to grade Ft
Use Stormwater	Direction Downstream	Flow control Not Controlled	Media No A-1
Shape Circular	Height 36	Width ins	Preclean H Year Cleaned 2011/11/16
Material Reinforced Concrete Pipe	Joint length 3.0	Ft Total length 126.0	Ft Length Surveyed 126.00
Lining	Year laid	Year rehabilitated	Weather Light Rain
Purpose Routine Assessment	Cat		
Additional info		Structural	O&M
Location Parking Lot		Miscellaneous	Hydraulic
Project CH2MHI-2	Work Order		
Northing	Easting	Elevation	
Coordinate System	GPS Accuracy		



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Pipe Graphic Report of PSR INLET-2 X for CH2MIHILL

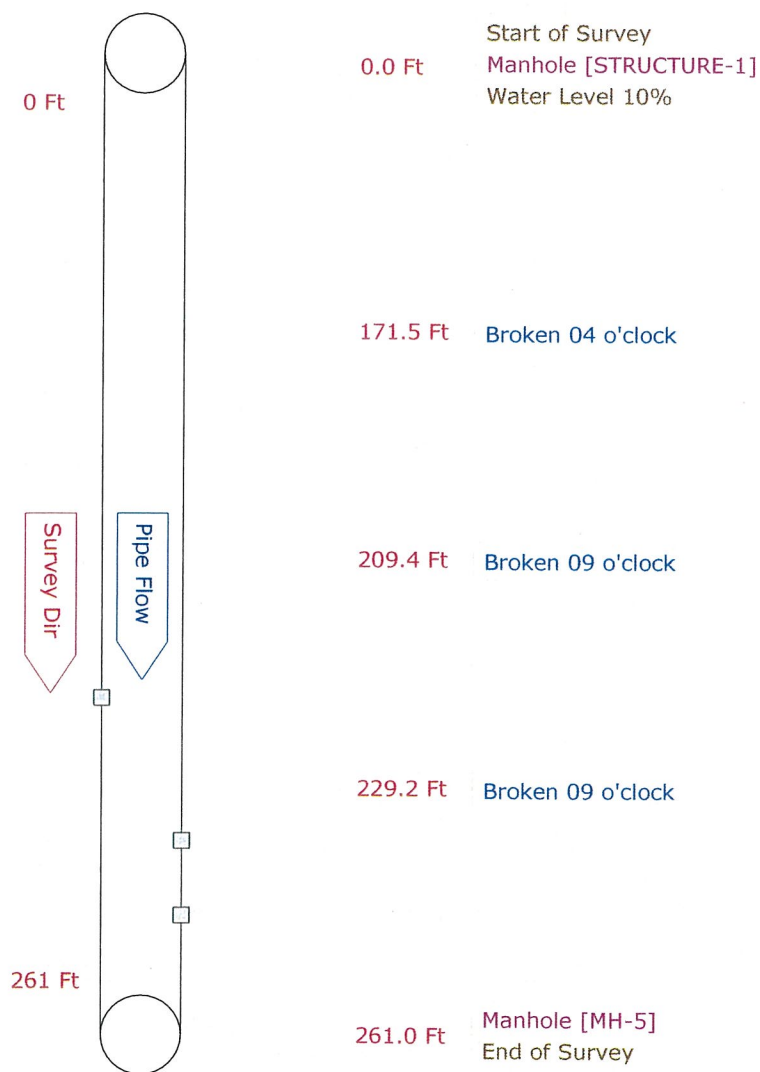
Setup 2	Surveyor JRH	Certificate # U-809-9224	System Owner CITY OF ALEXANDRIA
Drainage	Survey Customer CH2MHILL		
P/O #	Date 2011/11/17	Time 16:10	Street COLVIN ST
City ALEXANDRIA	Further location details		
Start INLET-1	Rim to invert 0.00	Grade to invert	Rim to grade Ft
Finish INLET-2	Rim to invert 0.00	Grade to invert	Rim to grade Ft
Use Stormwater	Direction Upstream	Flow control Not Controlled	Media No A-1
Shape Circular	Height 36	Width ins	Preclean H Year Cleaned 2011/11/16
Material Reinforced Concrete Pipe	Joint length 3.0 Ft	Total length 52.0 Ft	Length Surveyed 52.00
Lining	Year laid	Year rehabilitated	Weather Light Rain
Purpose Routine Assessment	Cat		
Additional info		<div>Structural O&M Constructional</div> <div>Miscellaneous Hydraulic</div>	
Location Parking Lot	Work Order		
Project CH2MHI-2			
Northing	Easting	Elevation	
Coordinate System	GPS Accuracy		



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Pipe Graphic Report of PSR STRUCTURE-1 X for CH2MIHILL

Setup 3	Surveyor JRH	Certificate # U-809-9224	System Owner CITY OF ALEXANDRIA
Drainage	Survey Customer CH2MHILL		
P/O #	Date 2011/11/18	Time 15:20	Street BUSINESS CENTER DR
City ALEXANDRIA	Further location details		
Start STRUCTURE-1	Rim to invert 0.00	Grade to invert	Rim to grade Ft
Finish MH-5	Rim to invert 0.00	Grade to invert	Rim to grade Ft
Use Stormwater	Direction Downstream	Flow control Not Controlled	Media No A-2
Shape Circular	Height 36	Width ins	Preclean H
Material Reinforced Concrete Pipe	Joint length 3.0	Ft	Total length 261.0
Lining	Year laid	Year rehabilitated	Weather Light Rain
Purpose Routine Assessment	Cat		
Additional info		<div> <div>Structural</div> <div>Miscellaneous</div> </div> <div> <div>O&M</div> <div>Hydraulic</div> </div> <div> <div>Constructional</div> </div>	
Location Parking Lot		Work Order	
Project CH2MHI-2			
Northing	Easting	Elevation	
Coordinate System		GPS Accuracy	



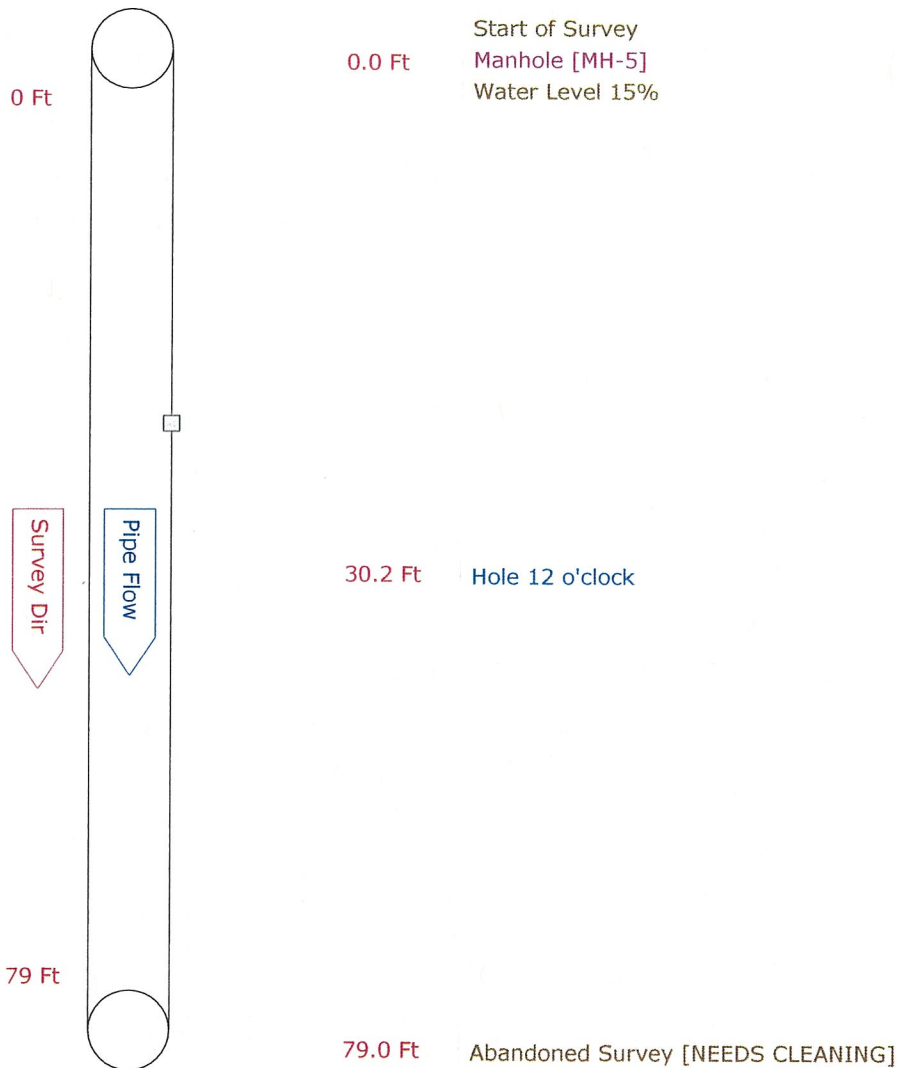
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Pipe Graphic Report of PSR MH-5

X

for CH2MIHILL

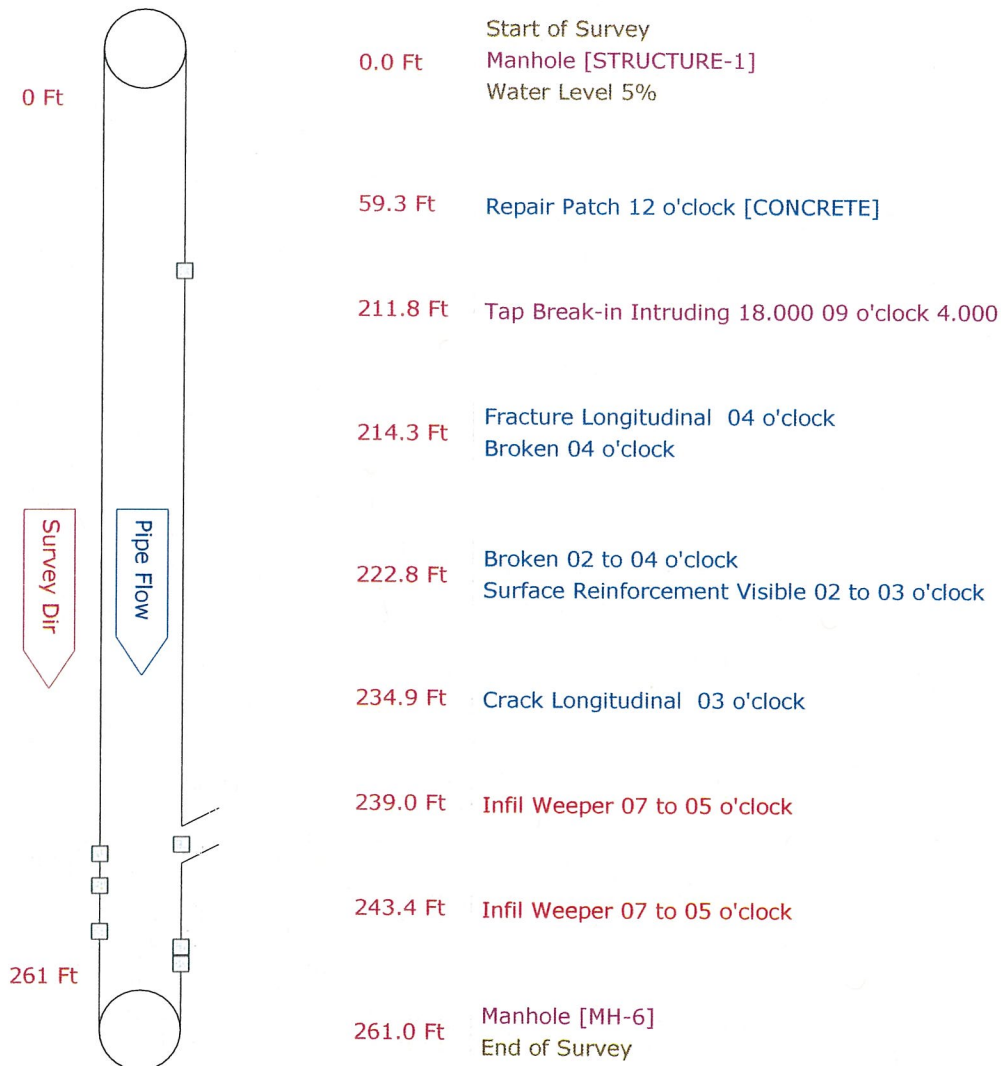
Setup 4	Surveyor JRH	Certificate # U-809-9224	System Owner CITY OF ALEXANDRIA
Drainage	Survey Customer CH2MHILL		
P/O #	Date 2011/11/18	Time 15:31	Street BUSINESS CENTER DR
City ALEXANDRIA	Further location details		
Start MH-5	Rim to invert 0.00	Grade to invert	Rim to grade Ft
Finish MH-3	Rim to invert 0.00	Grade to invert	Rim to grade Ft
Use Stormwater	Direction Downstream	Flow control Not Controlled	Media No A-2
Shape Circular	Height 36	Width ins	Preclean H Year Cleaned 2011/11/16
Material Reinforced Concrete Pipe	Joint length 3.0 Ft	Total length Ft	Length Surveyed 79.00
Lining	Year laid	Year rehabilitated	Weather Light Rain
Purpose Routine Assessment	Cat		
Additional info		<div> <div>Structural</div> <div>O&M</div> <div>Constructional</div> </div>	
Location Parking Lot		Work Order	
Project CH2MHI-2		Elevation	
Northing		GPS Accuracy	
Coordinate System			



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Pipe Graphic Report of PSR STRUCTURE-1 A for CH2MIHILL

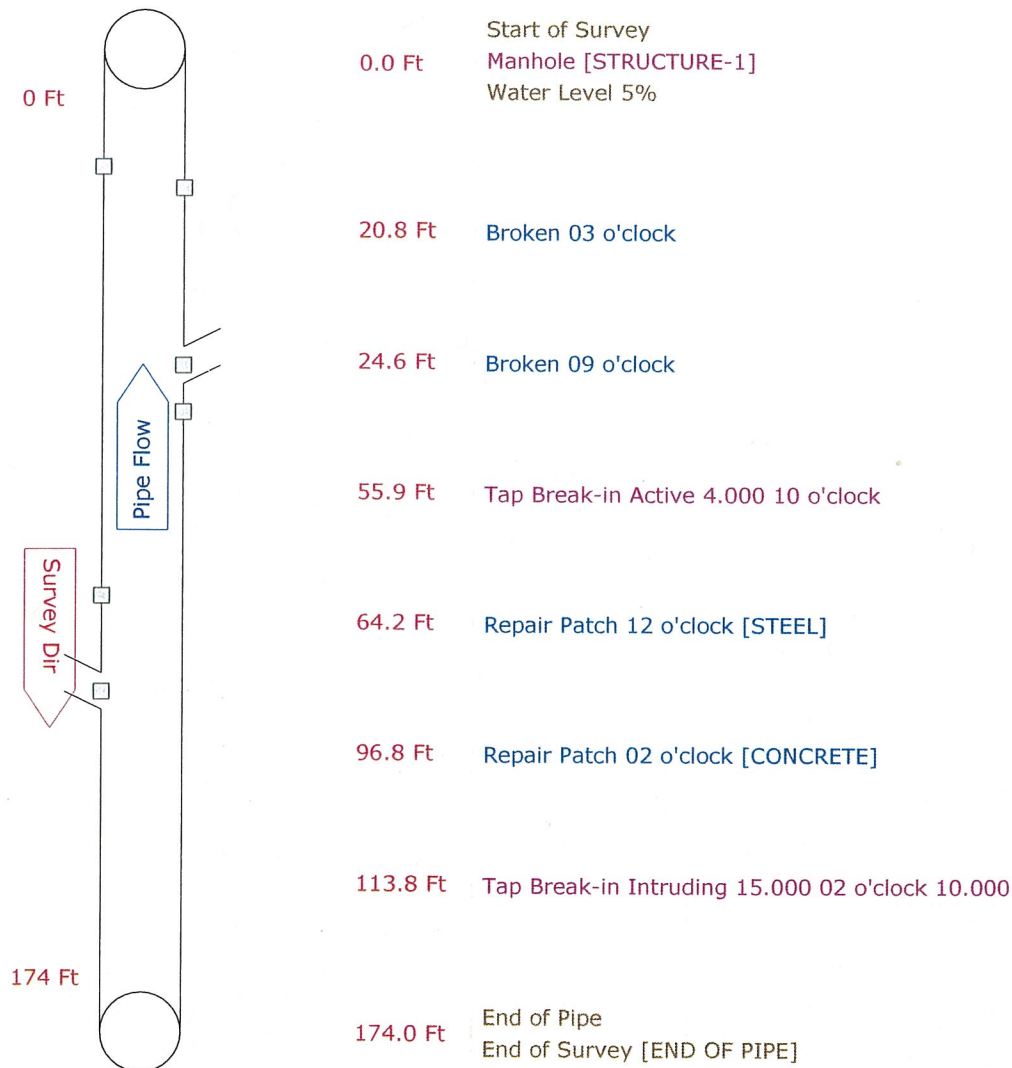
Setup 5	Surveyor JRH	Certificate # U-809-9224	System Owner CITY OF ALEXANDRIA
Drainage	Survey Customer CH2MHILL		
P/O #	Date 2011/11/19	Time 13:20	Street COLVIN ST
City ALEXANDRIA	Further location details		
Start STRUCTURE-1	Rim to invert 0.00	Grade to invert	Rim to grade Ft
Finish MH-6	Rim to invert 0.00	Grade to invert	Rim to grade Ft
Use Stormwater	Direction Downstream	Flow control Not Controlled	Media No A-3
Shape Circular	Height 36	Width ins Preclean H	Year Cleaned 2011/11/16
Material Reinforced Concrete Pipe	Joint length 3.0 Ft	Total length 261.0 Ft	Length Surveyed 261.00
Lining	Year laid	Year rehabilitated	Weather Light Rain
Purpose Routine Assessment	Cat		
Additional info		<div>Structural O&M Constructional</div> <div>Miscellaneous Hydraulic</div>	
Location Parking Lot	Work Order		
Project CH2MHI-2			
Northing	Easting	Elevation	
Coordinate System	GPS Accuracy		



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Pipe Graphic Report of PSR INLET-3 A for CH2MIHILL

Setup 6	Surveyor JRH	Certificate # U-809-9224	System Owner CITY OF ALEXANDRIA
Drainage	Survey Customer CH2MHILL		
P/O #	Date 2011/11/19	Time 13:52	Street COLVIN ST
City ALEXANDRIA	Further location details		
Start STRUCTURE-1	Rim to invert 0.00	Grade to invert	Rim to grade Ft
Finish END OF PIPE	Rim to invert 0.00	Grade to invert	Rim to grade Ft
Use Stormwater	Direction Upstream	Flow control Not Controlled	Media No A-3
Shape Circular	Height 36 Width ins	Preclean H	Year Cleaned 2011/11/16
Material Reinforced Concrete Pipe	Joint length 3.0 Ft	Total length 174.0 Ft	Length Surveyed 174.00
Lining	Year laid	Year rehabilitated	Weather Light Rain
Purpose Routine Assessment	Cat		
Additional info		<div> <div>Structural</div> <div>O&M</div> <div>Constructional</div> </div>	
Location Parking Lot		<div> <div>Miscellaneous</div> <div>Hydraulic</div> </div>	
Project CH2MHI-2		Work Order	
Northing		Easting	
Coordinate System		Elevation	
		GPS Accuracy	



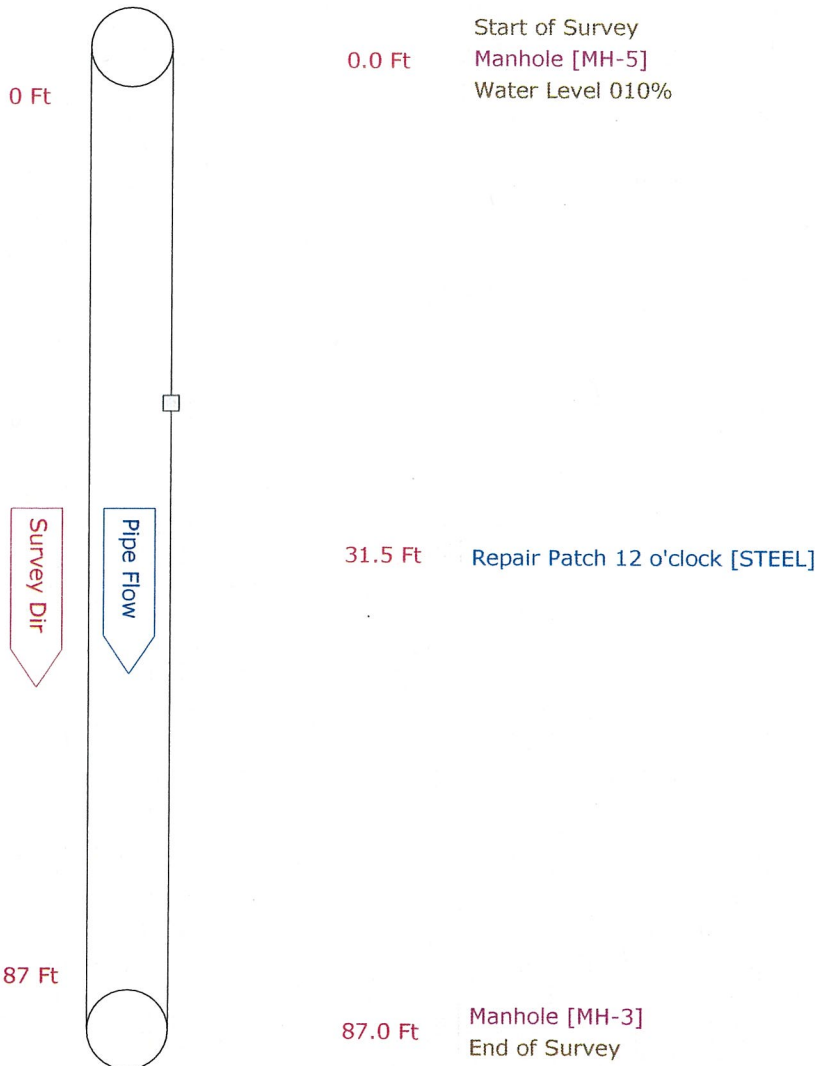
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Pipe Graphic Report of PSR MH-5

A

for CH2MIHILL

Setup 7	Surveyor JRH	Certificate # U-809-9224	System Owner CITY OF ALEXANDRIA
Drainage	Survey Customer CH2MHILL		
P/O #	Date 2011/11/19	Time 14:54	Street BUSINESS CENTER DR
City ALEXANDRIA	Further location details		
Start MH-5	Rim to invert 0.00	Grade to invert	Rim to grade Ft
Finish MH-3	Rim to invert 0.00	Grade to invert	Rim to grade Ft
Use Stormwater	Direction Downstream	Flow control Not Controlled	Media No A-3
Shape Circular	Height 36	Width ins	Preclean H Year Cleaned 2011/11/16
Material Reinforced Concrete Pipe	Joint length 3.0	Ft Total length 87.0	Ft Length Surveyed 87.00
Lining	Year laid	Year rehabilitated	Weather Light Rain
Purpose Routine Assessment	Cat		
Additional info		Structural	O&M
Location Parking Lot		Miscellaneous	Hydraulic
Project CH2MHI-2		Constructional	
Northing		Work Order	
Coordinate System		GPS Accuracy	



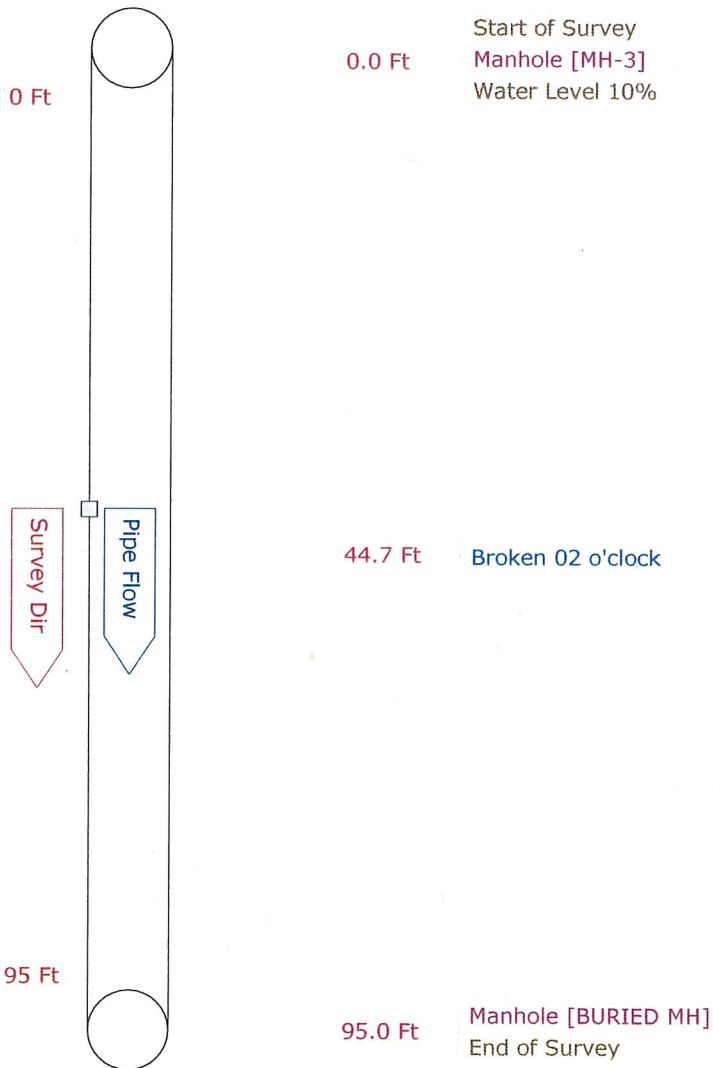
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Pipe Graphic Report of PSR MH-3

A

for CH2MIHILL

Setup 8	Surveyor JRH	Certificate # U-809-9224	System Owner CITY OF ALEXANDRIA
Drainage	Survey Customer CH2MHILL		
P/O #	Date 2011/11/19	Time 15:09	Street BUSINESS CENTER DR
City ALEXANDRIA	Further location details		
Start MH-3	Rim to invert 0.00	Grade to invert	Rim to grade Ft
Finish BURIED MH	Rim to invert 0.00	Grade to invert	Rim to grade Ft
Use Stormwater	Direction Downstream	Flow control Not Controlled	Media No A-3
Shape Circular	Height 36	Width ins	Preclean H
Material Reinforced Concrete Pipe	Joint length 3.0	Ft	Total length 95.0
Lining	Year laid	Year rehabilitated	Weather Light Rain
Purpose Routine Assessment	Cat		
Additional info		Structural	O&M
Location Parking Lot		Miscellaneous	Hydraulic
Project CH2MHI-2		Constructional	
Northing		Work Order	
Coordinate System		Easting	
		Elevation	
		GPS Accuracy	



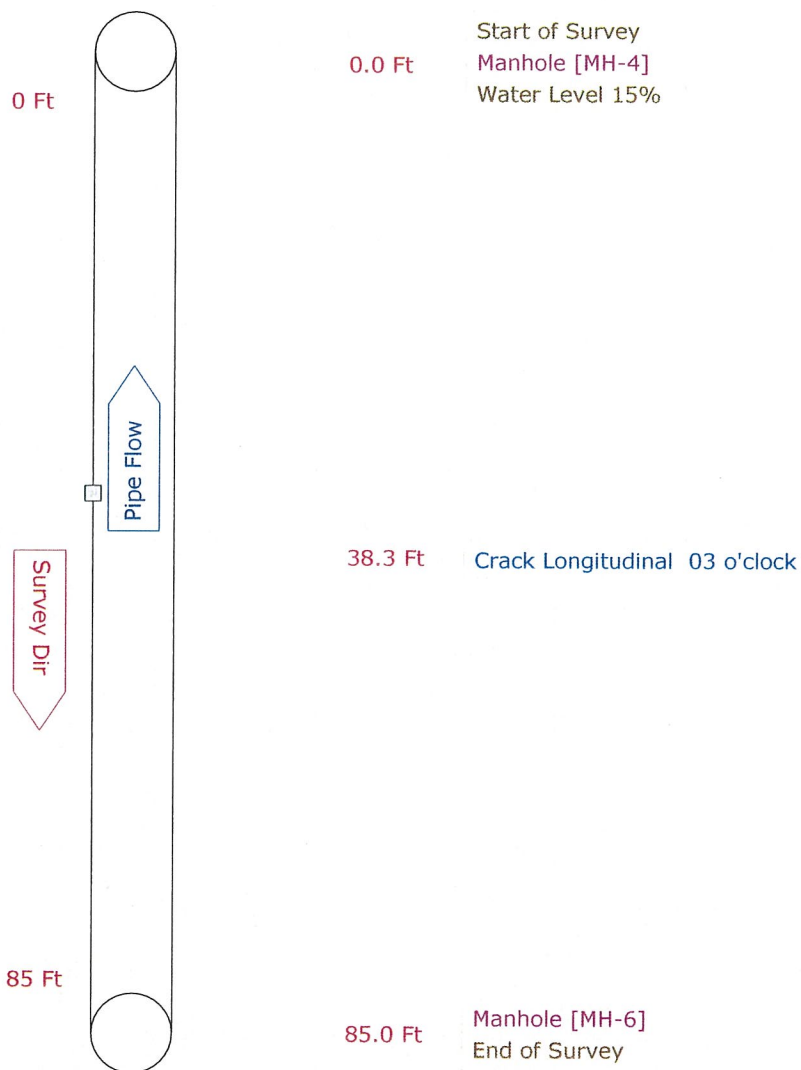
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Pipe Graphic Report of PSR MH-6

A

for CH2MIHILL

Setup 9	Surveyor JRH	Certificate # U-809-9224	System Owner CITY OF ALEXANDRIA
Drainage	Survey Customer CH2MHILL		
P/O #	Date 2011/11/22	Time 11:27	Street BUSINESS CENTER DR
City ALEXANDRIA	Further location details		
Start MH-4	Rim to invert 0.00	Grade to invert	Rim to grade Ft
Finish MH-6	Rim to invert 0.00	Grade to invert	Rim to grade Ft
Use Stormwater	Direction Upstream	Flow control Not Controlled	Media No A-4
Shape Circular	Height 36	Width ins Preclean H	Year Cleaned 2011/11/16
Material Reinforced Concrete Pipe	Joint length 3.0 Ft	Total length 85.0 Ft	Length Surveyed 85.00
Lining	Year laid	Year rehabilitated	Weather Light Rain
Purpose Routine Assessment	Cat		
Additional info		<div> <div>Structural</div> <div>Miscellaneous</div> </div> <div> <div>O&M</div> <div>Hydraulic</div> </div> <div> <div>Constructional</div> </div>	
Location Parking Lot		Work Order	
Project CH2MHI-2			
Northing	Easting	Elevation	
Coordinate System		GPS Accuracy	



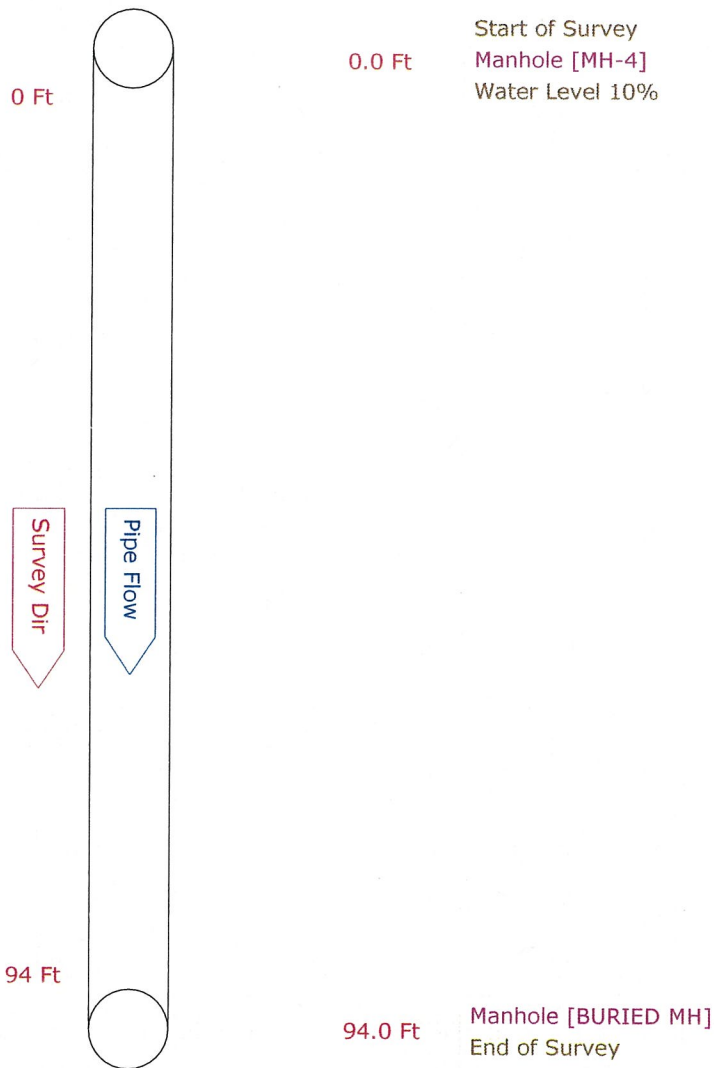
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Pipe Graphic Report of PSR MH-4

B

for CH2MIHILL

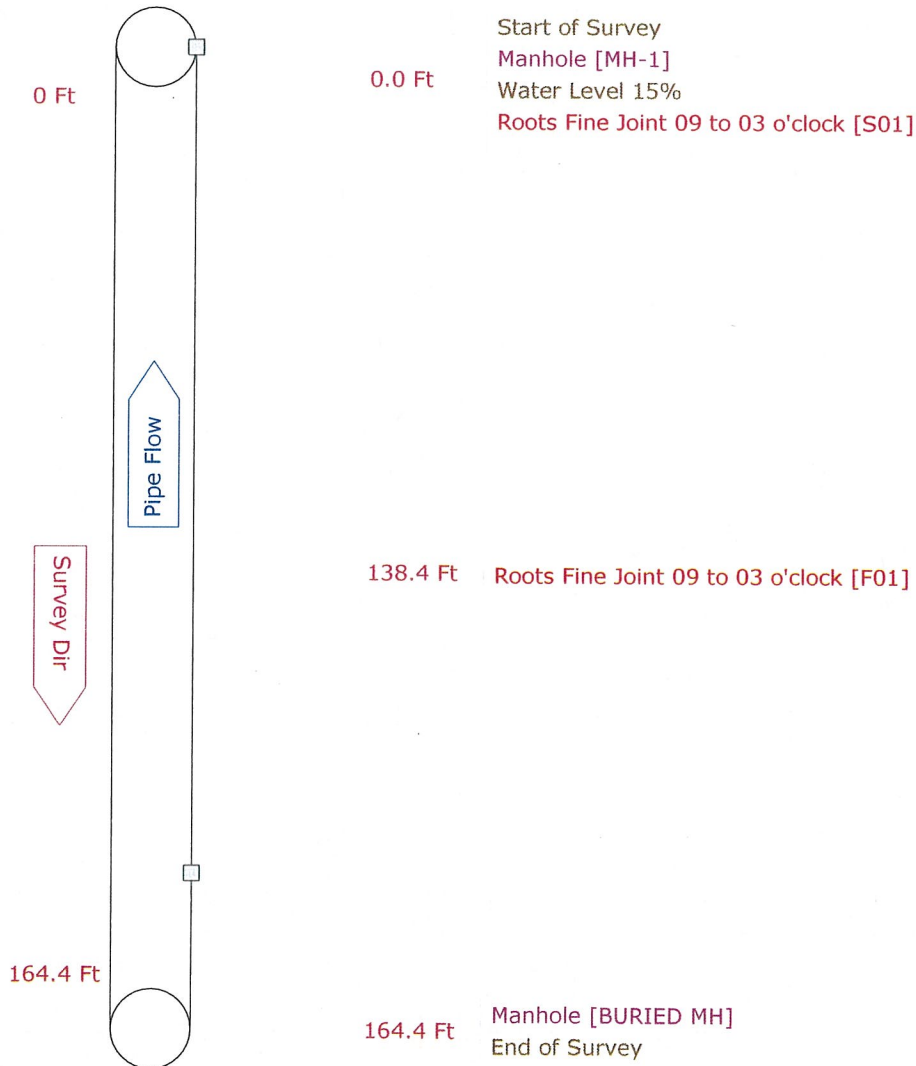
Setup 10	Surveyor JRH	Certificate # U-809-9224	System Owner CITY OF ALEXANDRIA
Drainage	Survey Customer CH2MHILL		
P/O #	Date 2011/11/25	Time 10:06	Street BUSINESS CENTER DR
City ALEXANDRIA	Further location details		
Start MH-4	Rim to invert 0.00	Grade to invert	Rim to grade Ft
Finish BURIED MH	Rim to invert 0.00	Grade to invert	Rim to grade Ft
Use Stormwater	Direction Downstream	Flow control Not Controlled	Media No A-5
Shape Circular	Height 36	Width ins	Preclean H Year Cleaned 2011/11/16
Material Reinforced Concrete Pipe	Joint length 3.0 Ft	Total length 94.0 Ft	Length Surveyed 94.00
Lining	Year laid	Year rehabilitated	Weather Dry
Purpose Routine Assessment	Cat		
Additional info		<div> <div>Structural</div> <div>O&M</div> <div>Constructional</div> </div>	
Location Parking Lot		Work Order	
Project CH2MHI-2			
Northing	Easting	Elevation	
Coordinate System		GPS Accuracy	



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Pipe Graphic Report of PSR BURIED MH B for CH2MIHILL

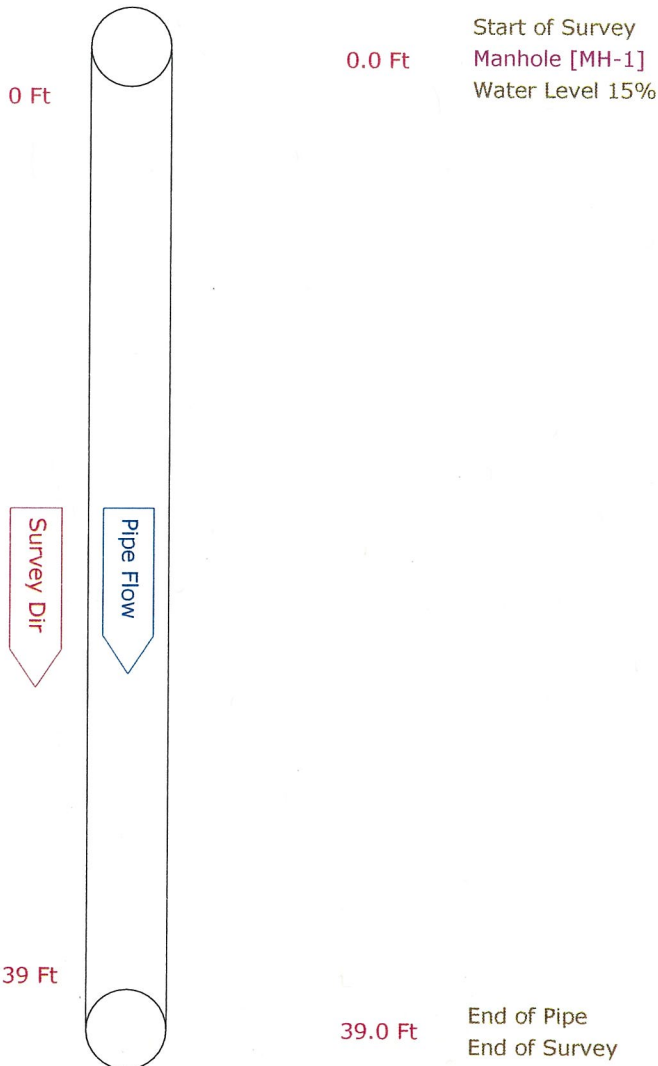
Setup 11	Surveyor JRH	Certificate # U-809-9224	System Owner CITY OF ALEXANDRIA
Drainage	Survey Customer CH2MHILL		
P/O #	Date 2011/11/25	Time 12:36	Street BUSINESS CENTER DR
City ALEXANDRIA	Further location details		
Start MH-1	Rim to invert 0.00	Grade to invert	Rim to grade Ft
Finish BURIED MH	Rim to invert 0.00	Grade to invert	Rim to grade Ft
Use Stormwater	Direction Upstream	Flow control Not Controlled	Media No A-5
Shape Circular	Height 36	Width ins	Preclean H Year Cleaned 2011/11/16
Material Reinforced Concrete Pipe	Joint length 3.0 Ft	Total length 164.4 Ft	Length Surveyed 164.40
Lining	Year laid	Year rehabilitated	Weather Dry
Purpose Routine Assessment	Cat		
Additional info		Structural	O&M
Location Parking Lot		Miscellaneous	Hydraulic
Project CH2MHI-2		Constructional	
Northing		Work Order	
Coordinate System		Easting	
		Elevation	
		GPS Accuracy	



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Pipe Graphic Report of PSR MH-1 B for CH2MIHILL

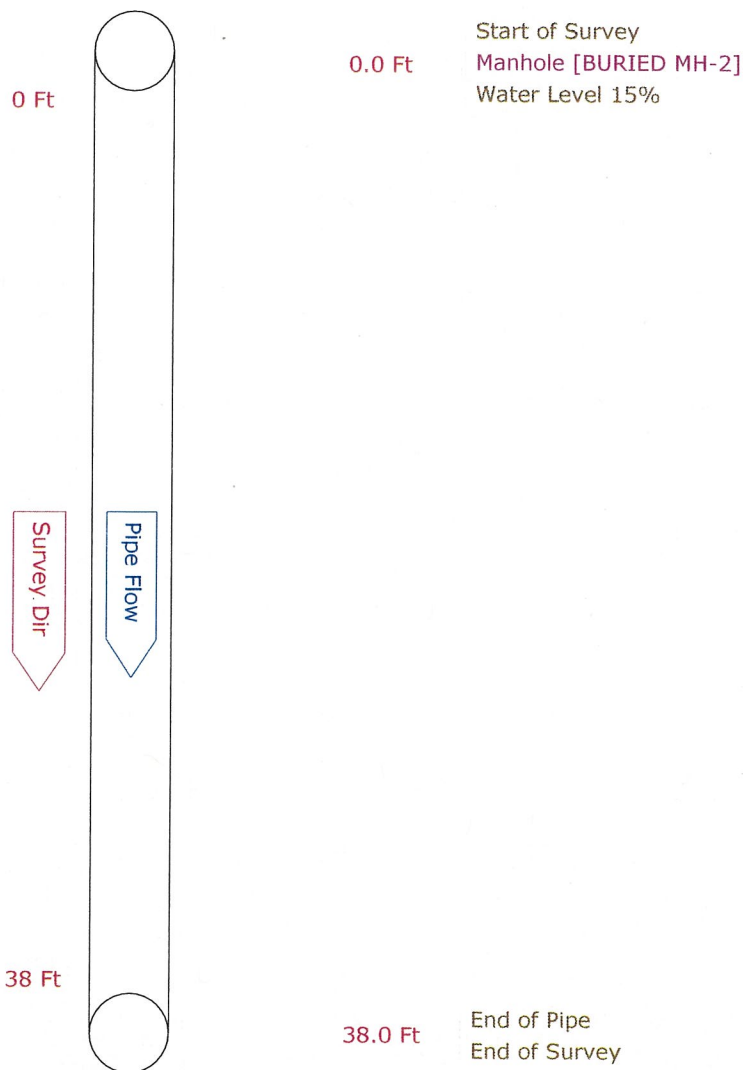
Setup 12	Surveyor JRH	Certificate # U-809-9224	System Owner CITY OF ALEXANDRIA
Drainage	Survey Customer CH2MHILL		
P/O #	Date 2011/11/25	Time 14:02	Street BUSINESS CENTER DR
City ALEXANDRIA	Further location details		
Start MH-1	Rim to invert 0.00	Grade to invert	Rim to grade Ft
Finish OUTFALL	Rim to invert 0.00	Grade to invert	Rim to grade Ft
Use Stormwater	Direction Downstream	Flow control Not Controlled	Media No A-5
Shape Circular	Height 36 Width ins	Preclean H	Year Cleaned 2011/11/16
Material Reinforced Concrete Pipe	Joint length 3.0 Ft	Total length 39.0 Ft	Length Surveyed 39.00
Lining	Year laid	Year rehabilitated	Weather Dry
Purpose Routine Assessment	Cat		
Additional info		Structural	O&M
Location Parking Lot		Miscellaneous	Hydraulic
Project CH2MHI-2		Work Order	
Northing		Easting	
Coordinate System		Elevation	
		GPS Accuracy	



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Pipe Graphic Report of PSR BURIED MH-2 B for CH2MIHILL

Setup 13	Surveyor JRH	Certificate # U-809-9224	System Owner CITY OF ALEXANDRIA
Drainage	Survey Customer CH2MHILL		
P/O #	Date 2011/11/25	Time 15:26	Street BUSINESS CENTER DR
City ALEXANDRIA	Further location details		
Start BURIED MH-2	Rim to invert 0.00	Grade to invert	Rim to grade Ft
Finish OUTFALL	Rim to invert 0.00	Grade to invert	Rim to grade Ft
Use Stormwater	Direction Downstream	Flow control Not Controlled	Media No A-5
Shape Circular	Height 36	Width ins	Preclean H Year Cleaned 2011/11/16
Material Reinforced Concrete Pipe	Joint length 3.0 Ft	Total length 38.0 Ft	Length Surveyed 38.00
Lining	Year laid	Year rehabilitated	Weather Dry
Purpose Routine Assessment	Cat		
Additional info		<div> <div>Structural</div> <div>O&M</div> <div>Constructional</div> </div>	
Location Parking Lot		<div> <div>Miscellaneous</div> <div>Hydraulic</div> </div>	
Project CH2MHI-2		Work Order	
Northing		Easting	
Coordinate System		Elevation	
		GPS Accuracy	



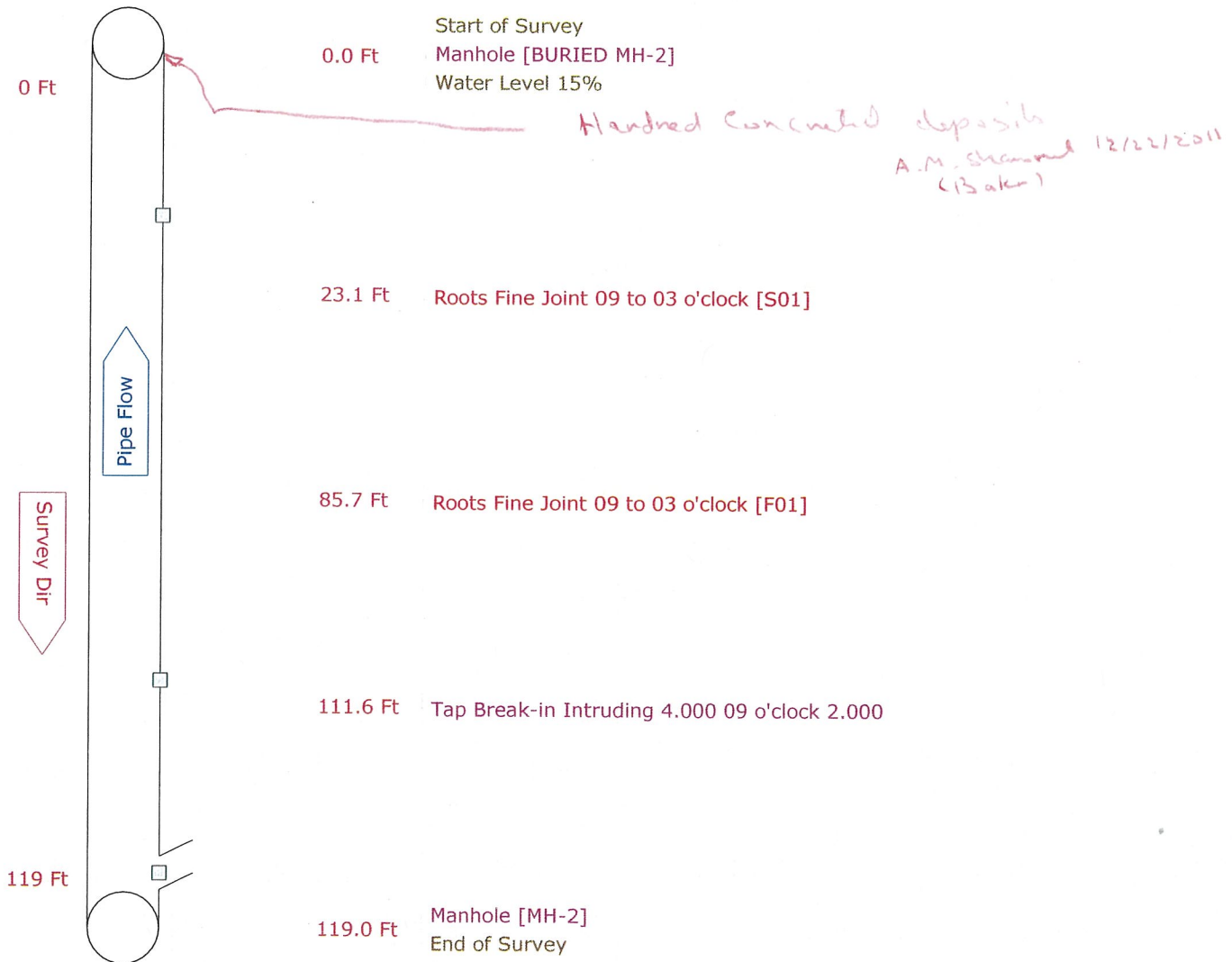
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Pipe Graphic Report of PSR MH-2

B

for CH2MIHILL

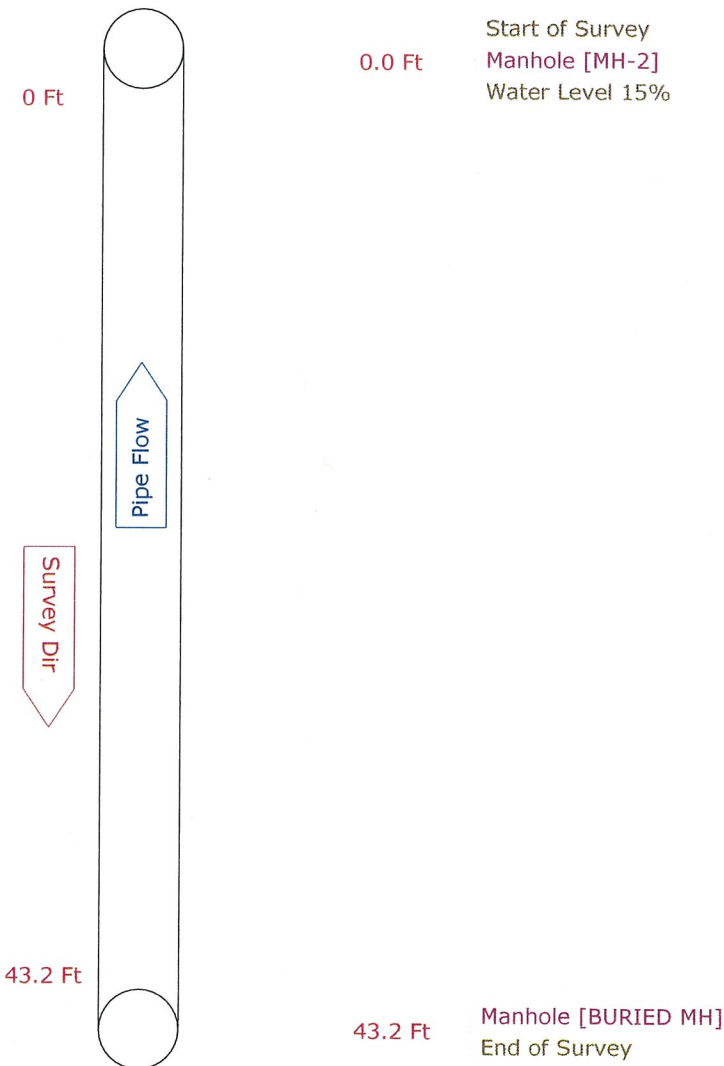
Setup 14	Surveyor JRH	Certificate # U-809-9224	System Owner CITY OF ALEXANDRIA
Drainage	Survey Customer CH2MHILL		
P/O #	Date 2011/11/25	Time 15:34	Street BUSINESS CENTER DR
City ALEXANDRIA	Further location details		
Start BURIED MH-2	Rim to invert 0.00	Grade to invert	Rim to grade Ft
Finish MH-2	Rim to invert 0.00	Grade to invert	Rim to grade Ft
Use Stormwater	Direction Upstream	Flow control Not Controlled	Media No A-5
Shape Circular	Height 36	Width ins	Preclean H
Material Reinforced Concrete Pipe	Joint length 3.0	Ft	Total length 119.0
Lining	Year laid	Year rehabilitated	Weather Dry
Purpose Routine Assessment	Cat		
Additional info		Structural	O&M
Location Parking Lot		Miscellaneous	Hydraulic
Project CH2MHI-2		Constructional	
Northing		Work Order	
Coordinate System		GPS Accuracy	



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Pipe Graphic Report of PSR BURIED MH C for CH2MIHILL

Setup 15	Surveyor JRH	Certificate # U-809-9224	System Owner CITY OF ALEXANDRIA
Drainage	Survey Customer CH2MHILL		
P/O #	Date 2011/11/25	Time 15:42	Street BUSINESS CENTER DR
City ALEXANDRIA	Further location details		
Start MH-2	Rim to invert 0.00	Grade to invert	Rim to grade Ft
Finish BURIED MH	Rim to invert 0.00	Grade to invert	Rim to grade Ft
Use Stormwater	Direction Upstream	Flow control Not Controlled	Media No A-5
Shape Circular	Height 36	Width ins	Preclean H Year Cleaned 2011/11/16
Material Reinforced Concrete Pipe	Joint length 3.0	Ft Total length 43.2	Ft Length Surveyed 43.20
Lining	Year laid	Year rehabilitated	Weather Dry
Purpose Routine Assessment	Cat		
Additional info		Structural	O&M
Location Parking Lot		Miscellaneous	Hydraulic
Project CH2MHI-2		Work Order	
Northing	Easting	Elevation	
Coordinate System	GPS Accuracy		



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